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ABSTRACT

To determine the effects of cartoon-embellished programed text materials on student skill performance and student attitudes towards instruction and subject material, a random sample of 85 students in a course on audiovisual materials were selected as research subjects. Research procedures included: (1) pretest for skills and attitudes; (2) random division into two groups; (3) treatment--one group exposed to an ordinary programed text on tape recorder operation and the other group exposed to a cartoon-embellished text; and (4) posttest on skills and attitudes. No significant differences were observed in any of the criterion measures. (EMH)

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The Effect of Cartoon-Embellished Programed Textual Instruction on Students' Skill Learning and Affective Learning

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Introduction

Historically the use of visuals in instructional material has not been based on an empirical foundation. Dwyer (1972) states that the production of visual illustrations is usually "based on the subjective feelings of the designer about what is best, the accessability of raw information, the availability of materials, the cost, the attractiveness of the finished product, and the availability of a ready market."

A great deal of money, time and energy has thus been invested in what may actually be inefficient and or ineffective instructional materials. Dwyer (1972) further states, "In essence, research should move in a direction to establish guidelines for the use of visuals that will maximize the probability that their use will ensure that the desired kinds of learning will occur."

Several researchers have already begun to establish needed guidelines for the use of visuals. Van Mondfrans and Travers (1964) investigated the effect of presenting a list of stimulus materials in three presentation modes (audially, visually, and audiovisually) on student learning. It was observed that using two sensory modalities has no advantage over using one modality in the learning of material that is redundant across modalities. Hartman (1961) presented information in audial, print, and pictorial form both indivisually and in combination. He observed that multiple channel presentations do not produce increases in learning over single channel presentations unless the situation in which the learning is elicited also contains the necessary additional cues. In a review of thirty studies of channel comparisons, Hartman (1961) concluded that when related materials were presented through either one channel alone or through two channels, there appeared to be an advantage in using a combination of channels. In discussing a principle called cue summation, in which cues are presented in two sensory modalities and elicit the same response thus summating to increase learning, Severin (1967) states that, "multichannel communications which combine words with related or relevant illustrations will provide the greatest gain because of the summation of cues between channels...assuming that the rate of presentation will not exceed the capacity of receivers to process this information..." Ketcham and Heath (1962) observed that the use of audial instruction which was associated with visual images produced an increase in fact learning. However, when abstract visual images were projected with the same audial instruction learning decreased.

It can be concluded from this research that the use of visuals designed to complement audial and printed instruction does not automatically improve student learning (Dwyer, 1972). It can further be concluded that additional research is needed which will systematically determine why, when, and how to use visuals appropriately.

One area of visualization that needs to be looked into is the use of visual embellishment. Travers (1964) observed that visual embellishments (1) add to the realism of a visual display (as when color is added), (2) emphasize particular parts of a transmission (use of humor), (3)draw attention to particular parts of a display (background color, arrows).

Some research on embellishment has already been undertaken, mainly in the area of cognitive skills, and results have generally favored the unembellished version. Lumsdaine and Gladstone (1958) used a slide-film (filmograph) to teach

a paired associate learning task concerning the learning of a phonetic alphabet It was observed that the introduction of cartoons and humorous sound effects decreased the amount of learning. McIntyre (1954) studied the effects of humor in a training film compared with two other film versions, one substituting print titles indicating content in place of humor and the other a straight forward film version. The humorous version included humorous marrator comments, trick photography, and fast and slow motion. Results indicated that more was learned when print titles were substituted for humor, and no difference was observed between the humorous and straightforward film versions. In a study reported by Travers (1964b) two groups of subjects were presented two sets of nonsense syllables in succession. One group saw slides containing black letters on a white background and another group saw the same syllables but in various colors and superimposed over a brightly colored background. Both groups were then presented another group of syllables on audio tape. The brightly colored visuals produced greater learning of their content, but resulted in lesser learning of the syllables presented through the audial version, thus leading Travers to conclude that devices used to draw attention to material presented in one sense modality tend to depress information received through another modality.

Baker and Popham (1965) and Popham (1969) researched the use of pictorial embellishment as it relates to both cognitive criteria (performance measures) and affective criteria (attitudes toward the instruction). In the earlier study the assumption was made that if subjects feel positive about the instruction, they will feel positive about the subject matter of the instructio In both studies cartoon-embellished slide-tape instruction was compared tp unembellished slide-tape instruction.No differences were observed on the cognitive measures in either study, and only in the earlier study was any difference observed for the affective measure, this favoring the embellished version. Attitude toward the subject matter was not measured.

Several areas of visual embellishment are presently in need of investigation. Research is needed which will investigate the value of cartoon-embellishment in instructional modes other than audiovisual presentations. Furhhermore, the ability to change learner attitude towards the subject mattercould be an important function of visual embellishment, if it can be shown that such a relationship indeed exists. Thus research is needed which will study the affective value of visual embellishment as it relates to learner attitude towards the subject matter of instruction.

The present study extends the work of Popham in that cartoon-embellished programed textual material was investigated in terms of its effect on student skills' performance (operation of audiovisual equipment), attitude toward the instruction, and attitude towards the subject matter of the instruction. It was hypothesized that the use of cartoon-embellishment of textual material will have no effect on learner performance on skills criteria, but that it will have a positive effect on learner attitude towards the instruction and the subject matter of the instruction. It was predicted that in the present study the version of the instruction (embellished or unembellished) will have no effect on subject performance on the skills performance measure. It was predicted that subjects receiving the embellished version will have a more positive attitude toward the instruction. It was also predicted that subjects receiving the cartoon-embellished version will have a more positive attitude change toward the subject matter than will subjects receiving the unembellished version.

Definitions

For the purposes of this study, cartoon is defined as "a line drawing that is symbolic and is intended as humor, caricature." (Webster's Third New International Dictionary of the English Language Unabridged). For the purposes of ease of production and replication, simple line drawings without detail or shading were used. Instruction was on the operation of a reel-to-reel tape recorder, and the cartoons represented visual puns of the instructional content caricatures of the equipment about which the instruction deals, and personifications of the equipment and materials. Caricature is defined by Webster's Third International Dictionary as "exaggeration by means of deliberate simplification and often ludicrous distortion of parts orcharicteristics." An example of personification would be a visual of a character with a head like a lever running along a narrow slot which represents a lever which "runs along a narrow slot."

Webster's Third New International Dictionary defines embellishment as follows, "decoration, adornment: to enhance, amplify, or garnish by elaboration with inessential but decorative or fanciful details." Travers (1965a)states the following, "Embellishments do not add information, and what they do add is often not even remotely relevant to the message that the audiovisual instructional device is designed to convey." Embellishments in this study contained humor to "emphasize particular parts of a transmission." (Travers, 1964a). Travers also describes embellishment as a technique for directing attention (emphasis through humor)."Relevant (embellishment) devices include any emphasis technique that is related to the specific information to be transmitted." Thus line drawings and caracatures with humorous intent were used as cartoon-embellishments. The instruction was in linear programed format, and there was one cartoon-embellishment per instructional frame.

Attitude change is defined as the difference in student scores on a six item pre- and post-instructional attitude survey using a Likert-type scale.

Subjects

Subjects were selected from approximately two hundred students enrolled in the course "Audiovisual Materials and Procedures in Education" at Arizona State University. During a lecture session all students were given a four-item questionnaire concerning their knowledge of the operation of a reel-to-reel tape recorder. Eighty-five students with two or more blank or incorrect answers were considered as members of the subject population for this study. A number was assigned to each of the eighty-five students. Using a table of random numbers and a method of sampling with replacement, subjects were assigned to two treatment groups. Due to subject mortality, sixty-eight subjects received instruction. Thirty-three subjects were in the embellished group., while thirty-five subjects were in the non-embellished group.

Criterion measures

Three criterion measures were employed. The first was subjects' reponses on an anonymously completed (coded) pretest/posttest Likert-type questionnaire measuring change in attitude towards the subject matter. Both the pretest and the posttest were identical, each containing six statements followed by a five choice (strongly agree to strongly disagree) rating scale.

The second criterion was a twenty-item posttest performance checklist on subjects' abilities to perform the terminal objective of the programed instruction.

The third criterion was subjects' responses on an anonymously completed (coded) four-item Likert-type questionnaire which required rating the instructional program in terms of interest, enjoyment, and learning. A fourth item asked students to rate whether or not they would like to learn to operate other audiovisual equipment with instruction similar to the program they had just completed. This questionnaire was administered on a posttest-only basis.

Materials

Two versions of a linear programed text designed and revised until effective (90% of the learners perform successfully on 90% of the objectives) by the experimenter were used in this study. Both of the instructional versions were identical in form and length, with the exception of the addition of cartoons to the embellished version. The instructional frames were designed according to the "small steps" approach defined by Markle (1969). The instructional programs were designed to enable the learner to be able to operate a Wollensak reel-to-reel monaural tape recorder.

The programs were tested on students in another audiovisual course entitled "Audiovisual Practices". Based on this tryout, necessary revision and retesting of the programs were done in order to produce an "effective" instructional product.

One version of the program contained cartoon-embellishments (as defined in the Introduction). The verbal material was clearly isolated from the cartoons by placing the verbal material in a rectangle. There was one cartoon with each instructional frame of the embellished version. There were twenty-two frames and cartoons in the program.

The other instructional version was identical to the embellished version in terms of verbal content, but no cartoon-embellishments were included.

Along with the textual program, a Wollensak reel-to-reel monaural tape recorder (model AV), with tape and microphone, was provided so that practice could occur during instruction.

Procedure

Course lab instructors assisted in the administration of treatments and in giving directions. Each of four lab instructors was given written direction and asked to rehearse prior to the time of treatment.

There were two instructional treatments, the embellished and the unembellished versions. Subjects were assigned to one of the treatments as described in the Subjects section.

Subjects received the treatments and were tested during the meeting time of their laboratory class. After the session began, subjects were told that they were going to participate in research related to instruction on the operation of a tape recorder. They were called into another room where they filled out a pre-instruction attitude survey, worked through the instruction, were checked out on the operation checklist by their lab instructor, and filled out two post-instructional attitude surveys. Subjects were also asked to indicate the time instruction began and ended. Those subjects in the embellished group were asked to respond to a question dealing with the degree to which they looked at the cartoons. Also, since practice was allowed, subjects were asked how many times they practiced the entire process.

The experimental design used was a pretest-treatment-posttest design with random assignment of subjects.

Analysis

For the purpose of analysis, the data was considered in terms of six criterion variables: (1) scores on the equipment operation checklist, (2) difference scores, measuring change from pretest to posttest, on attitude toward the subject matter, (3) rating of the instructional program in terms of desire for additional programs of a similar nature, (4) rating of the instructional program in terms of interest, (5) rating of the instructional program in terms of enjoyment, (6) rating of the instructional program in terms of learning.

For each of the criterion variables 1, 3, 4, 5, and 6 a t-test was used to compare the mean of the embellished group with the mean of the non-embellished group. For criterion variable 2, (attitude toward the subject matter) each subject's pretest score was subtracted from his posttest score. Difference scores were computed, and a t-test was used to compare the mean difference score. Means, standard deviations, and standard errors were also computed for each group on each criterion variable.

Results

In table 1 the means, standard deviations, and standard errors are presented for the two treatment groups on each of the six criterion measures. As can be seen, the first two measures indicate slightly greater means for the non-embellished group. The last four measures indicate slightly greater means for the embellished group. It should be noted that for criterion measures 1 and 2 a high score was desirable. For criterion measures 3 through 6 low scores were desirable. Thus all measures tend to favor the unembellished version, but always by a fraction of a point.

Insert Table 1 about here.

Table 2 indicates the t-tests performed on each of the six criterion measures to compare the means of the two groups. It should be noted that no significant difference was observed on any of the criterion measures.

Insert Table 2 about here.

The mean time spent on the instructional programs for each of the two groups was very similar. The embellished group averaged 40.12 minutes of instructional time spent, while the non-embellished group averaged 42.57 minutes of time spent.

The mean number of times that an individual practiced the operation was .76 (this is in addition to the practice required during the instruction) for the embellished group and .80 for the non-embellished group. This also represents quite similar results for the two groups.

Discussion

The purpose of this study was to determine the effects of cartoon-embellish programed textual material on student skill performance, student attitude toward the instruction, and student attitude change toward the subject matter of the instruction.

No significant differences were observed for any of the criterion measures. In terms of the performance measure, these results confirm the earlier work of Popham and the prediction that no observed differences would occur. Since the embellishments added no new information, and were at best redundancies of the verbal content, no additional learning was expected to occur.

In terms of attitude toward the instruction, it was predicted that this would be in favor of the embellished version. Several factors might have reduced the potential for this result to occur. It was observed (based on the question to be filled out at the end of the program) that students in the embellished group did not attend to the visuals as much as was expected. When asked to circl the term which best described the amount of cartoons looked at (all, most, some, very few, none), the greatest number of subjects circled some. In fact a frequen curve ofthese responses approaches normality with the mean and mode at some. This certainly diminishes the potential effect of cartoons in the programed text.

The same can be said for the lack of difference in attitude change toward the subject matter. In addition one might conclude that attitude toward subjct matter may take more time than a forty minute program.

It appears quite possible that given the choice of attending to the cartoon embellishments ~~embellishments~~ or not attending to them in a programed text, that students will often select the latter choice. This choice is not available in a programed audiovisual program. Thus embellishments may be more justified in an audiovisual program. Caution should be taken in generalizing these results to programs to programs requiring visualization and to programs using a different ratio of embellishments per frame. Perhaps a more detailed type of cartoon embellishment would also produce different results. If designers of programed textual instruction are considering a program with the type of embellishment mentioned in this study, they should perhaps spare themselves the time and expense needed to prepare and produce such cartoon-embellishments.

Table 1: Means, Standard Deviations, and Standard Errors For Subjects Using the Embellished and Non-embellished Programs

Criterion	Embellished Group[a]			Non-embellished Group[b]		
	X	S.D.	S.E.	X	S.D.	S.E.
1. Equipment operation checklist scores	18.94	1.48	.257	19.03	1.12	.190
2. Attitude toward subject matter (posttest minus pretest)	1.79	3.12	.543	1.83	2.05	.347
3. Rating program in terms of desire for additional programs	1.91	.77	.133	1.89	.72	.121
4. Rating program in terms of interest	2.03	.77	.134	1.86	.69	.117
5. Rating program in terms of enjoyment	2.30	.73	.127	2.06	.84	.142
6. Rating program in terms of learning	1.82	.73	.127	1.74	.70	.118

note a n=33 b n=35

Table 2: t-test Results on the Six Criterion Measures.

Criterion	F Value (variance)	T Value (means)	D.F.	2-tail probability
1. Equipment operation checklist scores	1.73	-.28	66	.780
2. Attitude toward subject matter (post minus pre)	2.32	-.06	55[b]	.950
3. Rating program in terms of desire for additional programs	1.13	.13	66	.897
4. Rating program in terms of interest	1.24	.98	66	.332
5. Rating program in terms of enjoyment	1.32	1.29	66	.202
6. Rating program in terms of learning	1.08	.44	66	.665

note [a] n=68

[b] All t-tests are based on a pooled variance estimate except for criterion 2 which is based on a separate variance estimate, since the F-test for variance was significant.

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